

Interak 1 System Description

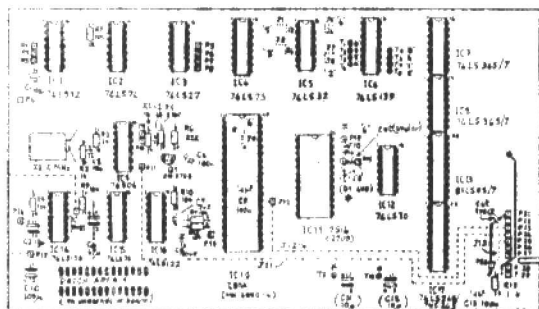
Interak 1 System Description

The basic theme of the Interak system is that individual functions are kept to individual cards. Combining functions on one card causes inconveniences and difficulties in the long term. (For example the idea of putting the system RAM on the CPU card. We are glad this wasn't done because in the days when the CPU card was designed 8 RAM chips were needed to provide just 1K of RAM — sockets for such chips on the CPU card would now be a millstone round our necks, and would have caused the CPU card to be obsolete long before its time.)

There are a few deviations from this theme however, for example the "SBC-1" card (Single Board Computer). This necessarily combines several functions on one board, but it is not intended to be the heart of a long lasting system, merely the cheapest way of implementing the chips of the day, for dedicated applications.

"Interak 1" is merely one arrangement of cards, which makes up a typical development system, and it is convenient for us to give the following descriptions of the cards from the standpoint of their being part of a complete system.

MZB-3 CPU Card



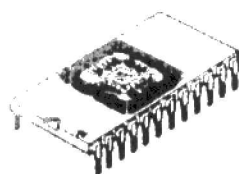
Bare Board "BMZB3" 10.95 + 15% VAT
Manual "MMZB3" 1.50 + 0% VAT

This is the "engine" of the computer system. The circuitry on this card (17 chips in all) is devoted to the purpose of looking after the needs of the Z80 CPU, and buffering the signals on and off the bus, so that this card can be used in the rack with up to a dozen others. There is space for one EPROM, which has to be on the board to start the system off, ie to "bootstrap" the operating system from disk. (Interak 1 is completely RAM based, and of course at power-on the RAM contains garbage). Connections for a reset switch are provided, and the reset is synchronised with the Z80 Op-code fetch, and is kept short by means of a monostable, so that dynamic RAM contents are not corrupted.

The EPROM for the MZB-3 card is sold separately, and can be one of several different types. Fundamentally these types divide into two classes: "ZYMOM" for a tape system, and "DMON" for a disk system.

The Z80 CPU speed recommended is 4 MHz. This is quite conservative by today's standards, and allows the use of readily available memory, and interfacing to ordinary speed peripherals. If 4 MHz is too slow for your aspirations, then we do not recommend a faster Z80 - this only gives modest speed improvement, but brings in all sorts of problems with the timing of bus transactions. Instead we think you should aim for one of the "super Z80s" which can be organised to zoom along internally, yet deal with the rest of the system at a more acceptable speed. Improved performance without the headaches. We do not have a card to use any of the "Super Z80s", which are really a bit too expensive for use at the moment, but we are keeping an eye on them so that they can be introduced later.

ZYMOM and DMON



DMON "DMON-M" 14.95 + 15% VAT
User Notes "MDMONX" 0.00

ZYMOM "EZYM204" 10.95 + 15% VAT
Manual "MZYM2" 5.00 + 0% VAT

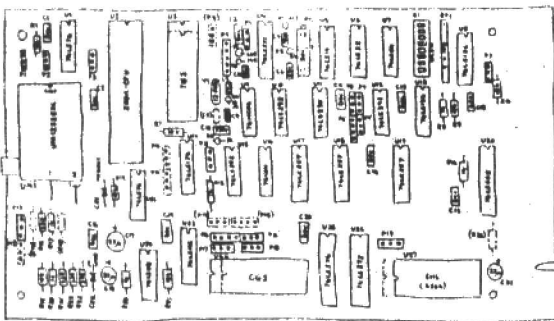
One of these two monitor programs is the general choice for an Interak System (but special EPROMs can be programmed by the user if he has the facilities, to make the system do anything he wants at power on).

Both allow simple entry of programs directly to memory, and execution, and debugging. This is often of use during the early stages of construction because

the user can at least start to use his system before he moves on to the expense of tape and/or disks.

If tape is going to be the means of program storage and data, then ZYMON is used. DMON is used for disks.

VDU-2K VDU Interface



Bare Board "BVDU2K" 18.75 + 15% VAT
Manual "MVDU2K" 2.50 + 0% VAT

This provides a VDU of modest specification, which is sufficient to get a system up and running. It gives a monochrome output for a standard monitor, or can be fitted with a UHF modulator to allow its use with a TV set. It overlays memory in the memory map of the computer, and effectively makes that memory visible, so if text is written to that area by the CPU that text can be read by the user.

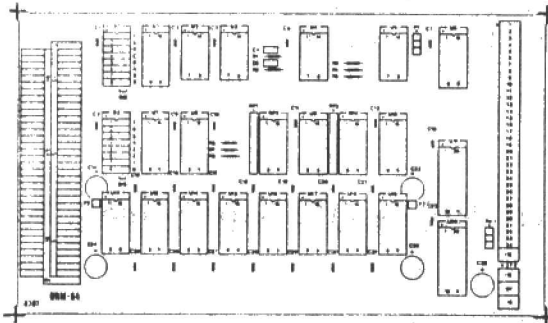
The character set is held in EPROM, and the EPROM supplied is large enough for a few variants. By way of demonstration the standard EPROM we supply contains a set of chess piece characters.

No CRT controller is used; the board is made from standard logic parts and EPROMs, RAM, Z80-CPU. The avoidance of a CRT controller gives the benefit that the board alone is ready for instant use without need for any setting up codes and the like, and fault finding and understanding of the principles are as simple as they can be, because there are no signals on the diagrams disappearing into mysterious "black boxes".

More sophisticated display interfaces are contemplated, but even in a more sophisticated system we feel there will always be a place for a separate simple text screen.

It is a very strong feature that the VDU-2K overlays the system RAM — for example if a VDU-2K ever becomes surplus to immediate requirements it will prove invaluable for say locating over the "stack" or "scratch pad" area in programs you write yourself. If things are going wrong you can see the disaster unfold in front of you without having to go through the tortuous process of "single stepping" through the program and breaking off to see what is in the scratch pad.

DRM-64 Dynamic RAM



Bare Board "BDRM64" 18.75 + 15% VAT
User Notes "MDRM64X" 0.00

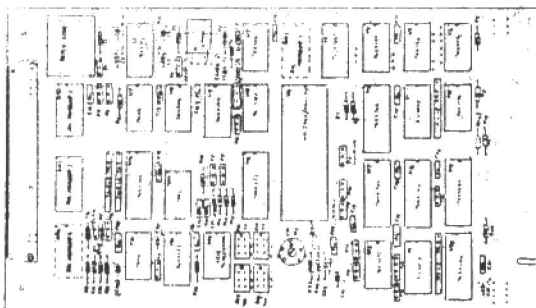
This is a card which takes advantage of the Z80s Dynamic RAM refresh abilities and provides 64K of dynamic RAM in the form of 8 64K x 1 bit 16 pin chips. The Z80 refresh is "transparent", ie refresh is performed automatically during a time (the op-code decode cycle) when the bus would otherwise be unused. Without this Z80 feature it would be necessary to install a refresh controller chip, or to take time off the Z80 microprocessor periodically to refresh the DRAMs.

A set of 16 switches on the board allow the RAM to be disabled in blocks of 4K. This is useful in development work to allow the user to substitute experimental cards of his own in selected areas of the memory map, for example experiments with "sideways" ROMs and the like.

This is not to say that we ourselves favour the idea of "sideways" ROMs at all. The idea of a finished system requiring the handling of software in vulnerable EPROMs seems foolish to us. The memory map in Interak is basically all RAM, and when a new program is required we think it better to load this in from tape or disk as appropriate. In that way you can have hundreds or even thousands of programs of various sizes — hardly feasible with a sideways ROM method.

There is a cost factor too: Storage in EPROMs offers about 32 bytes per penny — on disk the we have 5000 or more bytes per penny, and disks are of course easier to store and handle than EPROMs.

FDC-1 Floppy Disk Interface



Bare Board "BFDC1" 10.50 + 15% VAT
Manual "MFDC1" 3.00 + 0% VAT

This is the floppy disk interface. One FDC-1 card can support up to 4 disk drives, of varying types, although by suitable fiddling more than 4 could conceivably be used. (The limit of 4 drives is really a cabling constraint as the standard 34-way or 50-way cables only provide 4 "select" lines, and the internal jumpers in typical disk drives allow them to be selected as being one of the 4 lines defined.)

What the FDC-1 can do depends on the disk operating system (DMON in its most humble form, but realistically CP/M Plus.)

There are 4 sizes of diskette in common use: 3", 3.5", 5.25", 8". There are two side options: single sided, double sided. There are two density options: single density (FM) and double density (MFM). There are 4 track options: 35, 40, 77, 80. There are 3 write precompensation possibilities: none, precompensation at track 43, precompensation at a specified track. There are two basic interfaces: 34-way cable, 50-way cable. There are two single density data transfer rates: 125 kilobits per second, 250 kilobits per second. There are two double density transfer rates: 250 kilobits per second, 500 kilobits per second. There are 3 spindle speeds 300 rpm, 360 rpm, 600 rpm (early Sony 3.5" - rarely seen now). There are 4 sector sizes (bytes per sector): 128, 256, 512, 1024. There are 7 track to track stepping rates (ms): 30, 20, 15, 10, 12, 6, 3.

The FDC-1 supports all of these, although the use which is made of them depends of course on the software driving the board.

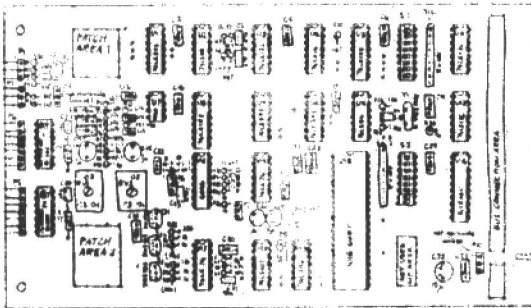
The chip used is the Western Digital 2797, a so called "single chip" floppy disk controller, but like all the "single chip" anything's I have seen, there are the odd one or two extras required to make the "single chip" work!

This is one of the few boards which require setting up with the aid of an oscilloscope. If you do not have the necessary equipment yourself, we have a setting up and testing service available (for a fee) if required.

The interface connector can be mounted on the board itself if the drives are to be mounted in the system rack (eg the 3.5" drives which we prefer), or an alternative connector can be supplied to mount on the front panel, to suit drives external to Interak.

The software products to use with the FDC-1 card are DMON on the MZB-3 CPU card, and CP/M Plus on disk.

DTI-1 Tape Interface



Base Board "BDTH" 17.75 + 15% VAT
Manual "MDTH" 2.50 + 0% VAT

Nobody nowadays would use tape when they could use disk, but we still keep the DTI-1 card on as part of the Interak range. Partly as a matter of principle – we boast so much that Interak is the system which never goes obsolete that it would be highly embarrassing for us to say this is an obsolete board!

There are a few special applications where tape can be used to advantage over disks – for example data logging in say scientific work, where the cost and complexity of disks are not justified. The DTI-1 card can control 2 tape recorders, with a start/stop relay, and so can be left unattended for the collection of random data.

In an Interak development system the only real point in considering tape is to save money. The ZYMON monitor program in EPROM should be used on the MZB-3 CPU card if the system is to work with tape. You are limited to programs you write yourself and programs you can obtain from the Interaktion User Group. We can supply a BASIC interpreter, and I think there is an editor/assembler from the user group, but apart from a few simple games that is about it. Obviously access to the CP/M Users' group library of programs and the Interaktion disk library depends on you having disks up and running.

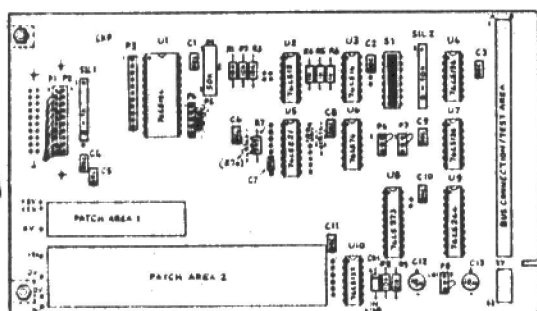
If finances or inclination direct you to tape as the storage medium instead of disk, then you will be pleased to learn that the DTI-1 is a particularly well designed interface. It uses the "CUTS" or "Kansas City" tape standard (Cassette Users Tape Standard, defined at a meeting of enthusiastic tape users in Kansas City one day a long time ago.) This is the most widely used "amateur" tape standard, but such manufacturers as Sinclair and Amstrad of course delight in ignoring the standard and defining their own.

The DTI-1 can operate at 300 baud, 1200 baud, or 2400 baud (and 600 baud with a bit of fiddling). Most other computers using CUTS limit themselves to 1200 baud. It is tricky to get past 1200 baud, but we have managed it by careful attention to detail, for example the provision of a crystal oscillator for stability of baud rate on record, and a phase locked loop to cope on playback with varying tape speeds due to mechanical imperfections in typical tape recorders.

The difference in 2400 baud, our maximum, is quite significant — for example an 8K program can load in less than a minute. Because of this it is still practical to keep a "clean machine", ie completely RAM based, and load the programs into RAM (eg BASIC). The benefit of this is that a transition to disks later is made much easier, because the fundamental nature of the system does not change.

A final set of uses for the DTI-1 card (I am scraping the bottom of the barrel now!) is for pure experimental purposes. For instance as the tape interface is in a way merely a digital to audio converter (and vice versa) it can be used to exchange data between two computers, maybe even over the public telephone network (check on the legality of this however). Another use would be to strip off the audio parts of the circuit and substitute an RS-232 driver/receiver chip. This is quite a convenient way to achieve a simple serial interface, for say communicating between computers, driving a serial printer or plotter, or for legal use on the telephone network via modems communicating with bulletin boards.

LKP-1 Latched Keyboard Port Input



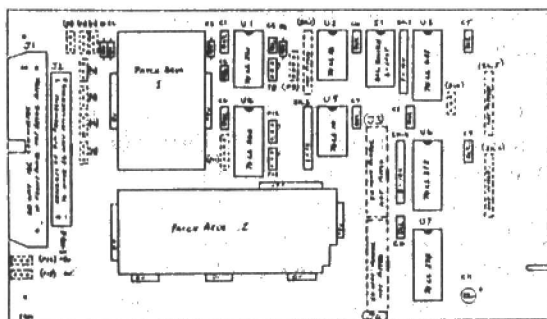
Bare Board "BLKP1" 17.75 + 16% VAT
Manual "MLKP1" 2.50 + 0% VAT

This is a relatively simple card which provides the interface between a parallel (7-bit ASCII + Strobe) keyboard and the Interak computer. TTL input levels are used, and power supplies are brought out to the front panel connector so that typical keyboard power requirements may be met. By means of a DIL switch the keyboard port may be selected to be any one of the 256 available I/O Ports, but of course it has to be selected to suit the software in use.

There are a number of bargain keyboards on the surplus market (remember I said that other computers are thrown away long before they're worn out — the keyboards must go somewhere). To suit those enthusiasts who can't resist a bargain a generous "patch area" is provided on the LKP-1 to allow say encoding of unencoded keys, recoding of the wrong codes and so on.

If the idea of scrabbling about on a rubbish tip for your keyboard seems undignified to you then we can offer a choice of high quality keyboards, already terminated in the appropriate connector, and completely ready for use. (Use the "Literature Request Form" to request further details.)

PRN-3 Parallel Printer Interface



Bare Board "BPRN3" 17.76 + 15% VAT
User Notes "MPRN3X" 0.60 + 0% VAT

This is another relatively simple card. It provides the parallel connection ("Centronics" interface) to suit the majority of printers in common use, Epson LX-800, etc.

The Centronics interface connector actually has 36 ways, but many economically minded manufacturers prune this down to 20-way. The PRN-3 interface can be used with either, although we prefer the connector always to be the proper "Centronics" style, unless funds are very short.

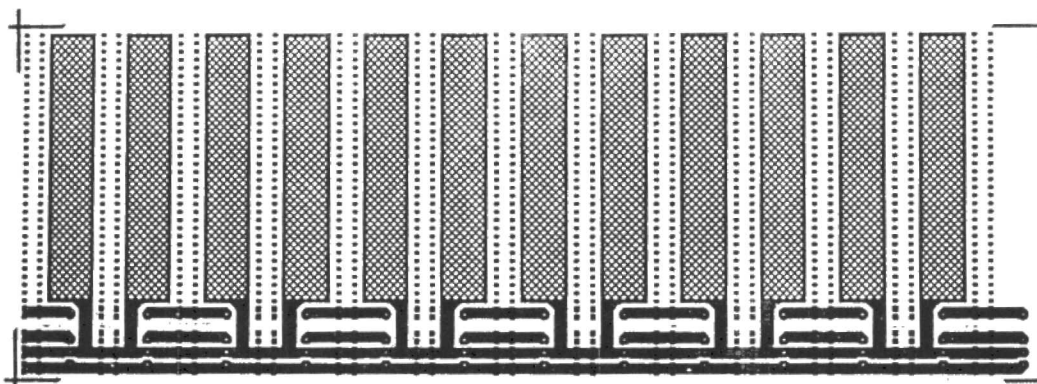
As a computer can generally send data to a printer faster than a printer can print it, some form of "handshaking" has to be used to regulate the flow of data if characters are not to be lost. The Centronics interface provides for two methods - one using an "Acknowledge" line (the printer acknowledges receipt of a character and implicitly asks for more) and the other using the "Busy" line (the printer asserts "Busy" whenever it is unable to accept a character). Our software and interface are designed to use the "Busy" line.

A benefit of this is that the handshaking then is very similar indeed to that employed for a simple serial (eg RS-232) interface, and thus a serial interface can be designed to appear exactly like the parallel interface. (More information on this topic is available on request to anyone interested.)

The PRN-3 card takes two of the Z80 I/O Ports, the precise Port addresses being freely selected by means of a DIL switch (but of course the port addresses you use have to suit the software in use).

The two ports are called "Status" and "Data" (as in a simple serial UART). The busy signal is connected to the Status Port and Data is transmitted via the Data Port. The necessary strobe to clock the data into the printer is generated by monostables on board, so the demands on the software are slight.

Both Ports are 8-bit, and thus the card can be used for other general I/O (Input and Output) purposes, particularly if advantage is taken of the patch area to add extra chips. Applications which suggest themselves are Analogue to Digital converters, speech synthesisers, sound generators, joystick ports and the like.



ISB-2 ISBUS-2 13-slot Backboard

Bare Board "BISB2" 13.50 + 15% VAT
User Notes "MISB2X" 1.00 + 0% VAT
Edge Connector "43DS" 3.95 + 15% VAT

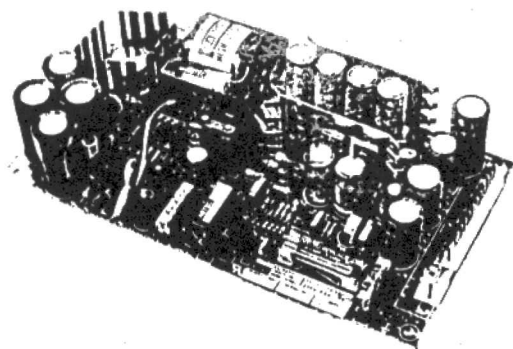
The backboard is a printed circuit board used to connect together all of the cards in an Interak System. There is no circuitry on the card, save a number of edge connectors (as many as you require, up to a maximum of 13). The connectors have two rows of contacts "A" and "B". Interak 1 only takes advantage of the "A" signals; the "B" lines are in place ready for when the system is expanded beyond present 64K limit. The division into "A" and "B" means that we can have the best of all worlds - a small system using the "A" signals alone, and a larger system using both "A" and "B". Care has of course been taken so far as is possible to allow 64K systems and future 16 Megabyte systems to remain compatible with one another.

The dimensions of the backboard are arrived at as follows: The rack is 19". Subtract 1" at each end for the mounting arrangements of the rack into the case, leaving 17". Subtract 4" for a pair of 3.5" drives, ergo: 13" left for the backboard. A basic pitch of 1" is used for the cards thus 13" will accommodate 13 cards.

13" is about the maximum length a bus can be in a system like this without causing problems. A longer backboard almost certainly would have to be made in a more expensive construction, for example multilayer, with buried ground tracks, termination components, line drivers and so on. We can't argue with the engineering wisdom of providing all this complexity, but by restricting the backboard to "only" 13 cards we successfully save a lot of money which can be spent more usefully elsewhere in the system.

A full list of the ISBUS connections is available, see the "Literature Request Form".

PSU9251 50W Switch mode PSU



Module "PS9251" 55.00 + 15% VAT
Manual "MPS9251" 2.00 + 0% VAT

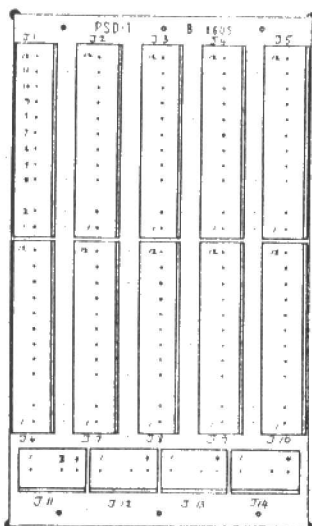
The Interak system is basically 5V only, but there are a few places where other voltages are required: The keyboard (perhaps, the one we supply requires +5V only), the disk drives, and the RS-232 serial interface card.

There is a trend in some schools of computer design to use dc to dc converters at every opportunity so that any voltage other than 5V can be eliminated. This is a bit futile in our opinion because introducing extra components to convert 5V into say +12V and -12V is really making no saving at all. The extra components are most conveniently introduced in the Power Supply design where they belong. If say 12V at 1 Amp is instead to be generated from the 5V rail, it will impose an additional burden of at least 2.4 amps on the 5V rail plus extra current to feed the dc to dc converter losses.

The PSU9251 Power Supply meets the Interak recommended power requirements, having +12V, -12V and +5V rails (there is also a -5V rail but nothing in the Interak system requires this voltage). The maximum current to be drawn from each rail is variable, within certain limits, provided the total burden is kept below 50 Watts. The power supply is a switch mode design and is therefore small and cool running, and it has overvoltage and overcurrent protection circuits. (A detailed specification, and a manual for use are available).

This module is different from the rest in that it is not supplied in kit form (it is a built and tested product from a specialist power supply manufacturer), and it does not fit into the system rack like the other cards.

Because there are hazardous voltages on the module, it must be mounted where there is no danger of it being touched in operation. The safest place for mounting is at the rear of the system rack, mounted on spacers over the ISBUS backboard. We can supply a kit of all the metalwork, spacers, etc required for mounting in this manner.



PSD-1 Power Supply Distribution

This is another card which differs from those in the normal Interak plug in range. The PSD-1 is used to distribute all the power around the system, and to act as a commoning point for the 0V Earth or "Ground" connection.

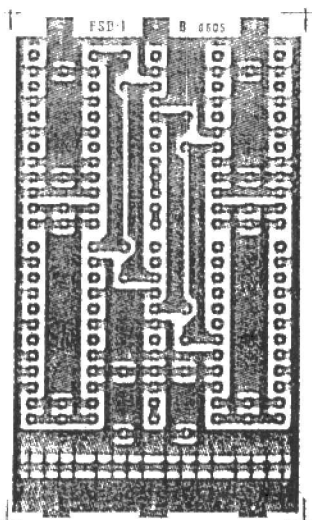
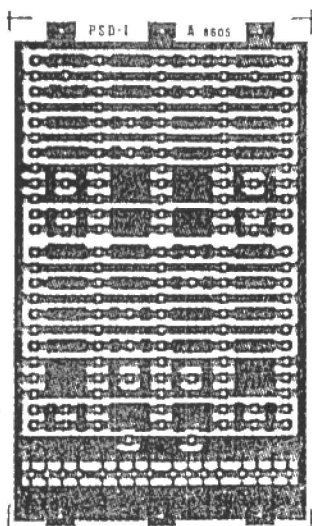
The PSD-1 mounts in the same way as we recommend for the PSU9251, and again we can supply a kit of all the required parts.

The PSD-1 provides 10 parallel power connectors, each of 12-way, less one way for polarisation. Also there are four 4-way connectors (less polarisation positions) for the common "Earth" line.

The correct way to distribute power around a computer is to provide an individual feed and return for each rail, preferably twisting the feed and return together so that any noise or spikes induced in one conductor are likely to be cancelled out by exactly the same being induced in the other. Also great care must be taken with earthing – for function as well as safety. It is insufficient simply to earth the case where the mains power comes in – the rack must be earthed, the 0V rail on the power supply must be earthed, the lid of the computer must be earthed, the bottom panel, and so on. Throughout, heavier cable than you might think must be used to keep the volt drop down should any part of the wiring be subject to current surges and spikes during operation.

The PSD-1 provides for all these requirements, and the use here as elsewhere in the system of plug in connections allows work, expansion etc, on the computer to be carried out conveniently and reliably.

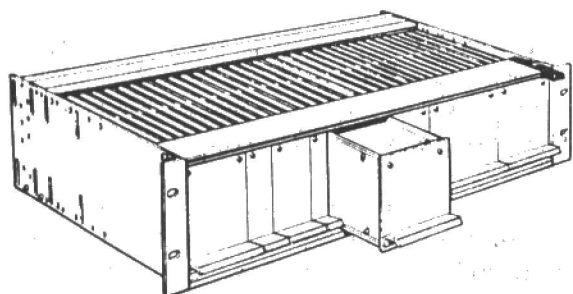
Without a proper power distribution arrangement, the temptation is to use screw terminal blocks or some such, and these are prone to broken wires or poor connections where the terminal screw meets the insulation of the wire instead of the conductor inside. I know of at least two cases (before the PSD-1 was designed) where catastrophic damage was caused to expensive disk drives by customers making slightly wrong connections with the power supplies.



Bare Board "BPSD1" 5.75 + 15% VAT
User Notes "MPSD1" 1.00 + 0% VAT

As the PSD-1 connections have been standardised by us, we can supply ready assembled cable harnesses to connect say the power supply to the PSD-1 or say the PSD-1 to the Disk Drives. Provided the cables are plugged in as the polarisation dictates it is impossible to get a damaging polarity reversal or mix up two power rails altogether, with the inevitable disastrous consequences.

3U Rack



Card Frame "3URACK" 29.95 + 15% VAT
User Notes "M3URACKX" 0.00

Racks for the International Size (8" x 4.5") Cards are available from a number of sources, eg RS Components, Electromail and so on, but the supplier we recommend is of course ourselves, because we obviously will be most familiar with the exact requirements of the Interak system.

The rack (alternatively known as a Card Frame) is an arrangement of extruded aluminium members about 17" long, fastened onto metal side plates, with provision for clip in card guides. The rear extrusions have a channel which forms part of the fixing arrangements for the edge connectors, and for the spacers for mounting the power supply and PSD-1 Board. The card guides and fixings are sold separately because different people use different quantities.

Floppy Disk Drives



Disk Drive "FDD3501" 89.00 + 15% VAT
OEM Manual "MFDD3501" 5.00 + 0% VAT

The 3.5" drives we supply and recommend, are ideal for fitting into the rack. We can supply a disk drive mounting kit for each drive which allows it to be slid into the rack just like a printed circuit board would be. Each drive is mounted vertically, and takes up a 2" space in the rack. The system will work with a single disk drive, but 2 drives are thought of as the reasonable working minimum. 2 drives thus take up 4", and so fit very neatly into the 4" reserved for disk drives. If more drives are added and are fitted into the rack then edge connector positions will have to be sacrificed. Fortunately the disk drive mounting arrangements result in a module which is shorter than an 8" Interak card so it is not necessary to alter the backboard physically. (Of course if you know in advance that you are going to sacrifice edge connector positions then it would be wisest not to purchase edge connectors for those locations.)

The capacity of the disk drives we supply is 1 Megabyte, which gives you several hundred Kilobytes once the necessary formatting operation has been carried out on the disk in use.

Case

As Interak is based on a standard 19" industrial racking system, suitable "3U" cases are available from a variety of sources, ranging from the scrap heap, through expensive, to very expensive. We have selected a case for Interak that we would be proud to own. It is a case that is often used for professional equipment selling for thousands of pounds. It is by no means the most expensive case which could be used, but we think it is the best, taking everything into account.

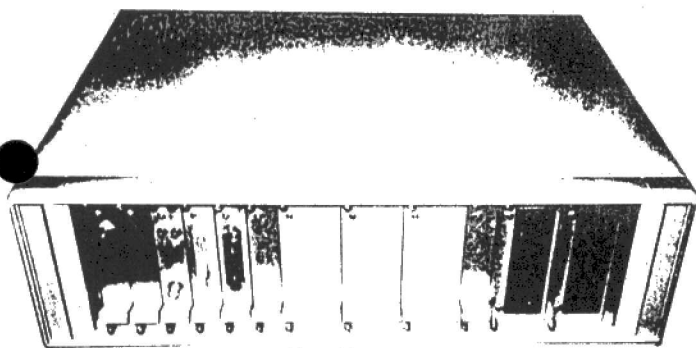
The purchase of a case is very like the purchase of the whole Interak system. We often see customers thinking and agonising for weeks, trying to decide whether they can justify the purchase of top quality equipment. Once the ordeal of parting with the money is over, those who have bought the best are often kind enough to contact us and say how pleased they were that they made the decision.

Fitted in a decent case, with a decent keyboard, Interak becomes a thing of beauty, and a thing of beauty is a joy forever, its loveliness increases; it will never pass into nothingness, (as a potential Interak enthusiast, a Mr J Keats, remarked in 1817).

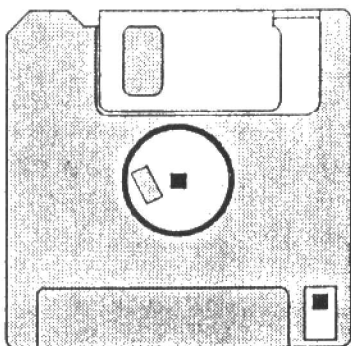
CP/M Plus

This is the "disk operating system" which performs the magic of allowing any program running under CP/M on one machine to run under CP/M on any other. (This is a gross exaggeration as it turns out, but CP/M is the nearest anyone has ever come to making different machines appear the same.)

The operating system of a computer provides the means of performing the basic actions required by a program, for example opening disk files, getting information from the keyboard, outputting it as required to the screen, the printer, back onto the disk, and so on. All you have to do in your program is set



Case "3UDIPCASE" 74.95 + 15% VAT
User Notes "MDIPCSEX" 0.00



CP/M Plus "DCPM3035" 50.50 + 15% VAT
Digital Research manuals "MCPM30DR" 60.00 + 0% VAT
Greenbank Manual "MCPM30GE" 10.00 + 0% VAT

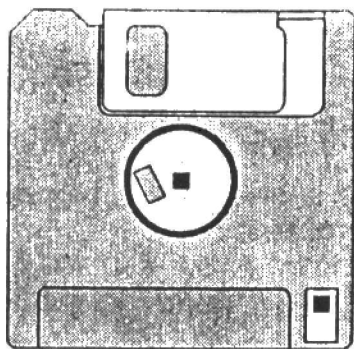
up the action you want and execute a "BDOS Call" (a call to the basic disk operating system). Since the same basic calls are available on all CP/M computers, a program using these appropriately will thus immediately run on any other CP/M computer.

Our implementation of CP/M Plus is supplied on a 3.5" disk and includes over 50 files or programs, totalling around four hundred Kilobytes. An 8080 macro assembler, relocating macro assembler, link/loader and debugger are included (the Z80 runs 8080 code) and a library "Z80.LIB" to extend the macro assembler to cope with the extra Z80 instructions which the 8080 does not possess.

Instructions and notes on CP/M Plus in relation to Interak are sold separately. The price includes an A4 size Interak 4-ring binder.

The full technical manuals and installation notes from Digital Research are also available separately, and are virtually essential if you are going to use CP/M for your own work (note that you do not need them if you merely are going to use CP/M Plus to load and run programs written by others). The price for the Digital Research CP/M Plus documentation includes 2 approximate A5 sized Digital Research 3 ring binders and slip-cases.

Applications Software



Hisoft Devpac 80 "HSDEV8035" 42.05
Hisoft Pascal 80 "HSPAS8035" 42.05
Hisoft "C" "HSC8035" 42.05

This is almost without limit, ranging from free (from the Bulletin Boards for example) to hundreds of pounds. Some software items which we keep in stock, having found them to be good quality products at reasonable prices, are CP/M programs from the specialist firm Hisoft.

First is Devpac 80 which is used for assembly language and machine code software development. Devpac 80 comprises 3 elements: ED80/HDE, a full screen editor/word processor, GEN80 the assembler, and PROMON the debugger.

The next is Pascal 80, a Pascal compiler (you write your programs in the high level language Pascal and the compiler turns them into machine code, which runs so much faster). This also includes ED80, for preparing the source code.

The last of the three is Hisoft "C". This is an advanced programmers language which provides a more general environment for producing machine code programs. Programs in "C" can be compiled to run on any microprocessor, if the compiler exists. In a way "C" is an assembly language for a generalised microprocessor — if the instructions exist in the microprocessor in use, well and good, otherwise "C" substitutes a sequence of instructions which will give the same effect, making the task of program writing much easier.

Other Cards

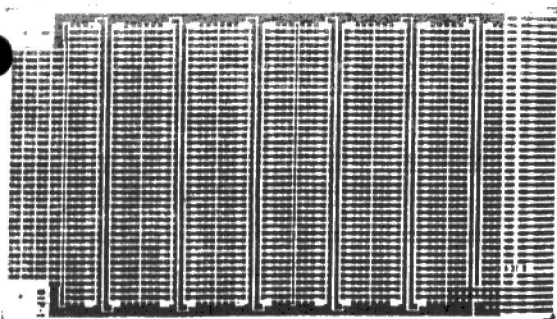
We have now concluded the description of the "Interak 1" example system built from the general Interak cards. There are other Interak cards available for use in the system, and/or separately, and some other points we should like to mention, but rather than begin a new leaflet we shall tack them on to the end of this one.



DIP-1 DIP prototyping card

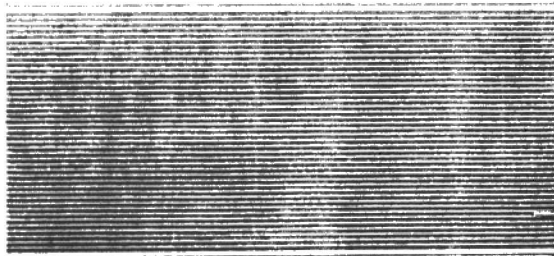
The DIP-1 card is a card which you will use when you start to build your own circuits, for example for some special interface we do not yet provide, or to try out some new chip you have read about in a magazine.

The DIP-1 is the same size as the other Interak cards in the system, with the usual double sided gold plated edge connector, and has a layout which routes the power supplies throughout the board so that DIP (dual in line package) integrated circuits can be mounted and interconnected. Virtually all of the Interak pcbs were first built by us as prototypes on the DIP-1 board. Because the finished board installs in the rack like the other cards, good looking reliable circuits can be constructed by hand, to suit your own particular needs.



Bare Board "BDIP1" 10.75 + 15% VAT

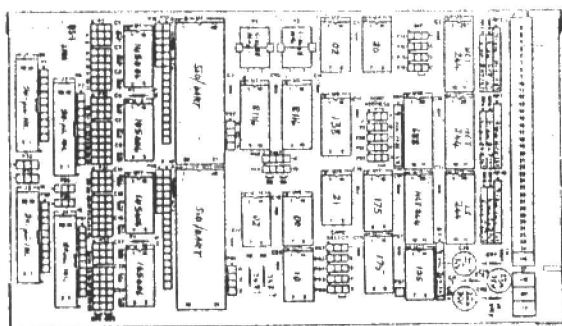
EXT-1 Extender Card



Bare Board "BEXT1" 12.75 + 15% VAT
Edge Connector "43DS" 3.95 + 15% VAT

The EXT-1 is used to simplify the task of testing and examining the circuitry on an Interak card whilst it is running. The EXT-1 is plugged into the rack, and the card under test is plugged into the extender. In this way full access to both sides of the board is gained for voltmeter and oscilloscope etc probes. The few Interak boards which require setting up and alignment of preset adjustments are most easily set up with the aid of an extender card.

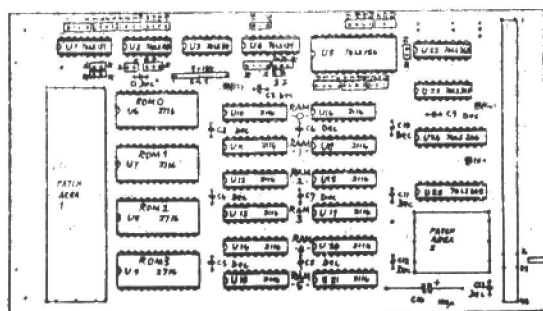
QS-1 Quad Serial RS-232



Bare Board "BQS1" 19.50 + 15% VAT
User Notes "MQS1X" 1.00 + 0% VAT

This provides 4 RS-232 channels, using a pair of the Z80 SIO (Serial Input Output) or DART (Dual Asynchronous Receiver Transmitter) chips. 4 separate programmable baud rates are provided for the 4 channels, and a special feature is that a "card select" method of address decoding allows several QS-1 cards to be used in the same system, at the same ports, sharing the same software routines. This allows the easy construction of say a 20 RS-232 multiplexer or "data concentrator", often used in data logging applications. Of course there is nothing to stop you using just one QS-1 card for 4 relatively mundane applications, say one serial port for a "mouse" or tracker ball, one for a plotter, one for a modem for calling up bulletin boards, and one for general purposes – say for a serial printer, or to upload or down load data with another computer entirely.

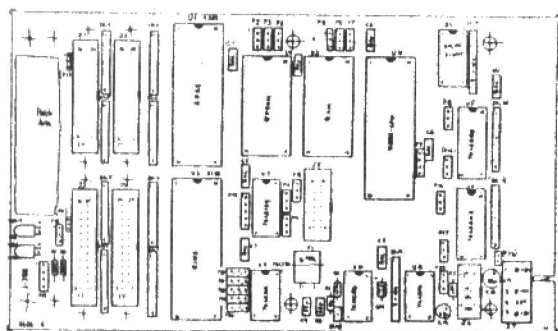
RRM-14 ROM/RAM



Bare Board "BRRM14" 17.75 + 15% VAT
User Notes "MRRM14X" 1.00 + 0% VAT

This is a card which has little more than sentimental value now, as developments in memory chip technology have rendered the RRM-14 pretty well out of date. The RRM-14 has space for 8K of ROM in the form of 4 type 2716 EPROMs, and/or 6K of static RAM in the form of 6 pairs of 2114 chips. Extensive and flexible address decoding arrangements are provided so it still makes a useful experimenter's board, and there is a good sized patch area, so it could be looked on as simply another form of DIP-1 card but with some chip connections already made.

SBC-1 Single Board Computer



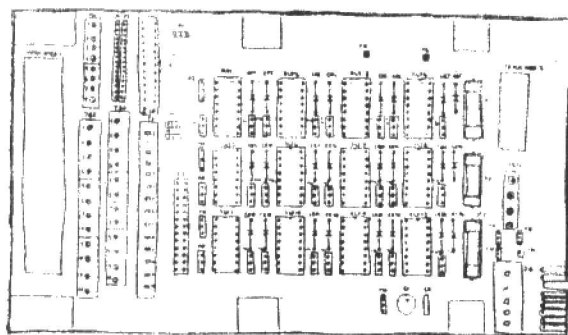
Bare Board "BSBC1" 17.75 + 16% VAT
User Notes "MSBC1X" 1.00 + 0% VAT

This at the opposite extreme to the multi-card Interak 1 system. Instead of the computer being built on numerous cards as described ie having basically one function per card, the SBC-1 has all of the elements of a (simple) computer on a single card. There is a Z80-CPU, an EPROM (2K/4K/8K/16K/32K depending on type), a RAM (2K/8K/32K depending on type), and 48 I/O lines in the 6 8-bit ports contained in a pair of 8255A PIAs.

The choice of a good quality and versatile means of connection has been made so that the 48 I/O lines can be used to full advantage, by connecting to other circuitry via ribbon cables or by plug in daughter boards or modules.

The particularly useful feature of the SBC-1 is that it is the same shape and size as the other Interak cards and so can be plugged into the Interak 1 system for development. (To do this an address decoder, and data bus buffer must be added in the sockets provided, and the on board Z80 and/or memories must be disabled.)

The program to suit the application can be written quickly and easily in the Interak development system, debugged while the SBC-1 is still plugged into the rack, transferred to EPROM and the SBC-1 will stand alone. It is certain to work perfectly at that stage without further debugging because the same software has been used at the same addresses, and the very same hardware (the SBC-1) has been used. Designs can go from ideas to production in hours instead of the days weeks or months if alternative methods are used.



Bare Board "BRI12" 17.75 + 16% VAT
User Notes "MRI12X" 1.00 + 0% VAT

RI-12 Relay Input board

This is a card designed for a specific security system we were called on to manufacture for one large organisation, but is offered for general sale. It works in conjunction with the SBC-1 I/O ports, and provides 12 relay inputs, with screw terminals for connection to plant (or house) wiring. 12V relays were

used in the original application which was to gather signals from ordinary intruder alarms, infra red detectors, door switches, time switches etc, on a high security site. The principle was that on detection of an intruder in a critical area "out of hours" the SBC-1 computer would secretly dial up a security headquarters via a modem, logging the call and the time on disk and on a printout. The system went on to switch slow scan TV cameras, and to catch the intruders before they knew that they had been detected, but we were not involved in that part of the design.

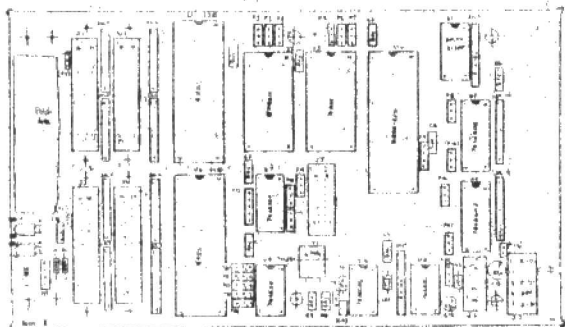
Relays were used at the customer's request rather than opto-isolators because 12V relay logic is more immune from static damage, spikes, etc and is easier to check out with ohm meters etc by electricians in an industrial plant environment.

If you have an Interak 1 computer you can make it pay for its keep by installing an SBC-1 and RI-12 card and it can keep an eye on your burglar alarm. Because of the isolation afforded by the relay inputs, a failure in the Interak computer (Heaven forbid) would not prevent the existing burglar alarm system from working normally.

Six 8-bit I/O Ports

This is a bit of a cheat. It is our old friend the SBC-1 card again, but stripped of its CPU, ROM and RAM, and with the Port Address and data bus buffer added. The two 8255A chips on the board each provide 3 8-bit ports, which can be programmed as inputs or outputs, according to the needs of the application. The parallel ports can be used for whatever the application demands, for example a hex keypad input, a ticket printer output, a bar code reader input, an output for a solenoid door lock, an input for a temperature sensor, an output for a heating element, and so on.

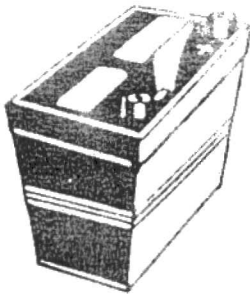
If an RS-232 interface chip is added, one of the lines can be used for serial communication. People generally think immediately of using a UART (Universal Asynchronous Receiver Transmitter) for a serial RS-232 output, but there often the cost can be avoided of providing such a chip, and all the paraphernalia of baud rate generation, parity checking, etc. The Z80 is more than powerful enough to do the job in just a few subroutines (details of which we can supply if you wish). You would have to write routines



Bare Board "BSBC1" 17.75 + 15% VAT
User Notes "MSBC1X" 1.00 + 0% VAT

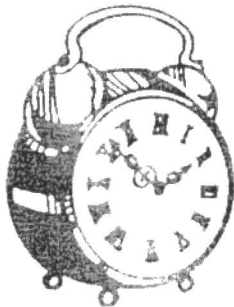
anyway if you used a UART and you would have to program a baud rate generator chip, so why not use our routines and effectively get the UART etc for free? The space in the EPROM will only cost pennies, and might have been spare anyway.

Battery Backed RAM



We have it in mind to produce an Interak card for this purpose but in the meantime the SBC-1 can be pressed into service yet again: A special 28 pin DIL socket can be obtained which will itself plug into the RAM socket on the SBC-1 and will from then on provide automatic battery back up facilities to a CMOS RAM plugged into it. The CMOS RAM can be 2K, 8K or 32K, according to application. If this is plugged into the Interak 1 system then the DIL switches provided on the 64K DRAM card can be used to disable the DRAM at the location of the battery backed RAM.

Of course if the I/O chips are being used as in the last application, the two functions can be achieved on a single SBC-1 card.



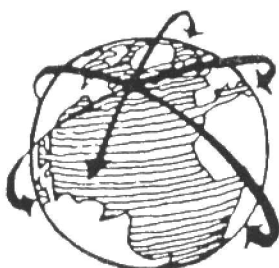
Real Time Clock

This is a variant of the Battery Backed RAM technique described above. This time the special socket includes a battery, back up circuitry and a real time clock, so that the card's function can be a real time clock and/or battery backed RAM.

2K - 32K EPROM

This is the SBC-1 again. It can be used as an EPROM card in an Interak System which does not require CP/M or the ZYMON or DMON monitors. Your own program can reside in the EPROM and make the computer do whatever you wanted, eg gathering data in a point of sale equipment and storing in battery backed RAM for later transmission (via an RS-232 Port built from one of the sections of the 8255A I/O chip). Or make up your own example!

If the MZB-3 CPU card is included in such a ROM-based system then either it must be re-strapped to fetch its first instruction from the EPROM on the SBC-1 card, or a small program be burnt into the onboard MZB-3 EPROM to jump directly to your own EPROM program.



User Groups etc

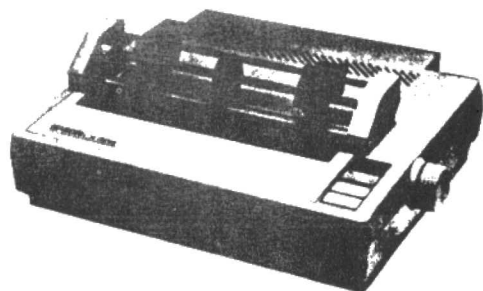
We recommend that you join the Interaktion User Group. If we have any information we wish to broadcast to the Interak community, the Interaktion Newsletter is the Journal in which we publish it.

Interaktion Disk Library: Copies of Library disks of programs are available on 3.5" diskettes (for a copying fee) to members of the Interaktion Users Group.

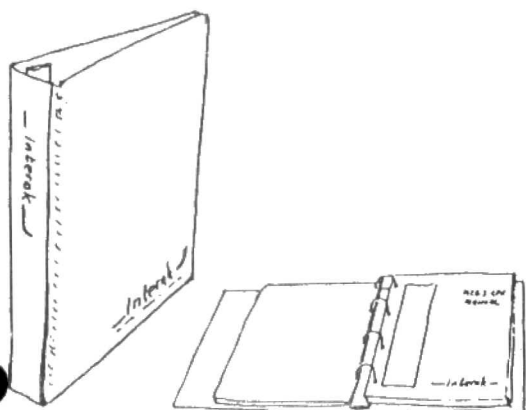
Taecom Interak Bulletin Board: This is the official Bulletin Board for Interak. You communicate with the board using a modem plugged into an ordinary BT socket. When possible Interak news will be posted on the board, but it is run independently of Greenbank Electronics by Tom Evans. There is a wealth of software which can be "downloaded" automatically to you free of charge, and there are many pages of interesting messages and comments (on other computers as well).

Another useful organisation is the CPM Users Group. They are a bit sniffy about letting the riff raff in, and jealously guard their public domain software from commercial users (as though it was they not the authors who had written it). They own all manner of CD-ROM disk apparatus and the like but have yet to be convinced of the existence of 3.5" disks, so conversions from the sizes they can supply are usually be carried out by some kind hearted fellow Interaker (join the Interaktion User Group to make contact.)

Public Domain Software Group. I do not have personal experience of this group, but have had my attention drawn to its existence by an Interak User.



LX800 Printer "EPSLX800" 229.00 + 15% VAT



Interak Deluxe Binder "IDLBIND" 5.25 + 15% VAT

Special Offer:

Pack of three Binders "IDLBIND3" 12.99 + 15% VAT



Sundry

We also stock a number of sundry items which are relevant to an Interak project.

A printer is invaluable. We recommend the Epson LX-800. Although it is at the bottom of the Epson dot matrix range in price it gives results which were at the top of the range a few years ago. (Near letter quality mode, choice of Fonts, Friction/Tractor feed, graphics modes, parallel interface, etc.)

Keyboards and disk drives have already been mentioned, and we can also supply other necessary peripherals, eg green screen or amber screen monitors, miniature rack mounting monitors, computer cassette tape recorders, modems, VDU terminals etc.

Components: Naturally we supply every component required for an Interak system, down to individual resistors and capacitors, but the range extends beyond the specific Interak parts, ie a wider range of "LS" TTL, "74HC", "4000 and 4500" CMOS, Memories, Crystals, Resistors, Capacitors, Diodes, LEDs, IC sockets, UHF Modulators, Cable, etc.

Consumables: Listing Paper (60 gsm one part and 2-Part, and micro-perforated, and 85 gsm pseudo A4), Ribbons, Diskettes.

Tools: Soldering irons, pliers, defluxing fluid, flush cutting nippers.

Interak Binders: On the bookshelf nothing looks finer than a set of our exquisite grained leather effect brown pvc covered gold blocked, padded "Interak" 4-ring A4 binders. We have a leaflet which offers a further couple of pages of similar purple prose if you are brave enough to read it.

Consultancy

We are always pleased to quote for design work, specialised system design and manufacture, software writing, etc. (Preferably with some relationship with the Interak system, but general electronics work is also undertaken.)



Goodbye; Ordering Information

Thank you for your interest and patience so far. If you require further information please use the enclosed "Literature Request Form" to obtain those detailed data sheets, parts lists etc which we provide free of charge. Manuals, boards and the like which are chargeable items can be ordered on our Order Form, but if you prefer you can use any other means, including telephone.

Access and Visa are welcome; please make cheques payable to "Greenbank Electronics". If it suits you better, send no money and we shall send our bill with the goods. (A VAT invoice is provided automatically by us for all transactions.) Unless you request otherwise we shall assume that any out of stock balances are to be kept on order for delivery in due course. There is no minimum order, but note our handling charge of 50p + VAT per order regardless of order size.

Production Details

This leaflet produced "in house" by Greenbank Electronics on an Interak 1 System; word processed on a 9.5" diskette using Wordstar running under CP/M Plus; text file size 48K; typeset using Fancy Font under CP/M Plus, driving an Epson FX-80 printer; photo reduced on Rank Xerox 1098Z plain paper photocopier Lithographic Offset printing by Greenbank Electronics (c) 1988